

rally formed close to the fine dentine. In a few situations I have observed one of the medullary canals continued across the fine dentine, and anastomosing with the corresponding canals of the cæmentum. The interspaces of the medullary canals of the coarse dentine are principally occupied by calcigerous tubes which have an irregular course, anastomose reticularly, and terminate in very fine cells. The more regular and parallel calcigerous tubes, which constitute the thin layer of hard dentine, are given off from the convexity of the terminal loops of the medullary canals. The course of these tubes (*b. fig. 1, Pl. XXXII.*) is rather more transversely to the axis of the tooth than the medullary canals from which they are continued. They run parallel to each other, but with minute undulations throughout their course, in which they are separated by interspaces equal to one and a half their own diameter. As they approach the cæmentum they divide and sub-divide, and grow more wavy and irregular: their terminal branches take on a bent direction, and form anastomoses, dilate into small cells, and many are seen to become continuous with the radiating fibres or tubes of the cells or corpuscles of the contiguous cæmentum. This substance enters largely into the constitution of the compound tooth of the Megatherium: it is characterized, like the cæmentum of the Elephant's grinder, by the presence of numerous radiated cells, or purkingian corpuscles, scattered throughout its substance, but may be distinguished by wide medullary canals which traverse it in a direction parallel with each other, and forming a slight angle with the transverse axis of the tooth. These canals are wider than those of the central coarse dentine, their diameter being $\frac{1}{12}$ of an inch; they are separated by interspaces equal to from four to six of their own diameters, divide a few times dichotomously in their course, and finally anastomose in loops, the convexity of which is directed towards, and in most cases is in close contiguity with, the layer of dense dentine.

Fine calcigerous tubes are every where given off at right angles from the medullary canals of the cæmentum, which form a rich reticulation in their interspaces, and a direct continuation between the loops of the medullary canals and the calcigerous tubes of the dense dentine. The cæmentum differs from the coarse dentine in the larger size and wider interspaces of its medullary canals, and by the presence of the bone-corpuscles in their interspaces; but they are brought into organic communication with each other, not only by means of the tubes of the dense dentine, but by occasional continuity of the medullary canals across that substance. The tooth of the Megatherium thus offers an unequivocal example of a course of nutriment from the dentine to the cæmentum, and reciprocally. Retzius observes with respect to the human tooth, that "the fine tubes of the cæmentum enter into immediate communications with the cells and tubes of the dentine (zahnknochen), so that this part can obtain from without the requi-

site humours after the central pulp has almost ceased to exist." In the Megatherium, however, those anastomoses have not to perform a vicarious office, since the pulp maintains its full size and functional activity during the whole period of the animal's existence. It relates to the higher organized condition, and greater degree of vitality of the entire grinder in that extinct species.

The conical cavities (*d. Pl. XXXI.*) attest the size and form of the persistent pulp; the diameter of its base is equal to the part of the crown of the tooth which is formed by the coarse and fine dentine. From the gradual thinning off, and final disappearance of these substances as they reach the base of the tooth, I conclude that they were both formed at the expense of the pulp. The fine tubes and cells must have been excavated in its peripheral layer for the reception of the hardening salts of the dense dentine, and the rest converted into the parallel series of medullary canals with their respective systems of calcigerous tubes, in a manner closely analogous to the development of the entire tooth of the *Orycteropus*. The coarser dentine of the tooth of the Megatherium differs, in fact, from the entire tooth of the *Orycteropus*, only in that the parallel medullary canals and their radiating calcigerous tubes are not separated from the contiguous canals by a distinct layer of cæmentum, and that the medullary canals anastomose at their peripheral extremities. The wide spaces, (*e. Pl. XXXI.*) indicate the thickness of the dental capsule by the ossification of which the exterior stratum of cement was formed. It was not until I knew the true structure of the tooth of the Megatherium, that I could comprehend the mode of its formation. The parallel layers of enamel in the Elephant's grinder are formed, as is well known, by membranous plates passing from the coronal end of the closed capsule towards the base of the tooth; but a certain extent of enamel can only thus be formed, and when the crown of the grinder has once protruded, and come into use, the enamel cannot be added to. The modification of the structure of the tooth of the Megatherium readily permits the uninterrupted and continuous formation of the dense substance which is analogous to the enamel of the Elephant's grinder.

With respect to the question of the respective affinities of the Megatherium to the Bradypodoid or Dasypodoid families, the result of this examination of the teeth speaks strongly for its closer relationship with the former group: the *Megalonyx*, *Mylodon*, and *Scelidotherium*, in like manner correspond in the structure of their teeth with the Sloth, and differ from the *Armadillo*.

If from a similarity of dental structure we may predicate a similarity of food, it may reasonably be conjectured that the leaves and soft succulent sprouts of trees may have been the staple diet of the Megatherioid quadrupeds, as of the existing Sloths. Their enormous claws, I conclude, from the fossorial character of the powerful mechanism by which they were worked, to have been employed,